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Long-term Experience with Membranes **SIEMENS**

**Memcor Asia Personnel (based in Windsor, Australia)**

- **More Water Treatment & membrane experience than any other Membrane Company**
  - ◆ Memcor Senior Process Engineers average 15 years Water Treatment experience
    - Sand Filters
    - Clarifiers
    - Activated Sludge
    - Demineralisation
    - Reverse Osmosis
  - ◆ Senior Project Engineers average 12 years Water Treatment Project experience
  - ◆ Senior Control System Engineers average 13 years Water Treatment Control system design & commissioning

Water Technologies

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Drivers for a Membrane Filter plant **SIEMENS**

- Variable feed water conditions
- Strong requirement for consistent Treated Water Quality:
  - ◆ Public Health
  - ◆ Pharmaceuticals
  - ◆ Water for Industrial processes
  - ◆ RO Feed
- Small footprint available

Severe consequences of failure

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Membrane Filtration

Water Technologies

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**Memcor Systems in Industry** **SIEMENS**

Memcor have very many systems in Asia:

- LG
- Phillips
- Samsung
- Amkor
- AMD
- PCB
- Hitachi
- Sanyo
- Matsushita
- Samsung Total
- Hyundai Petrochem
- Epson
- Mitsubishi
- Motorola
- Nippon
- Toshiba
- Sharp
- Sony
- Honda
- etc...

These companies demand high quality and RELIABILITY

Water Technologies

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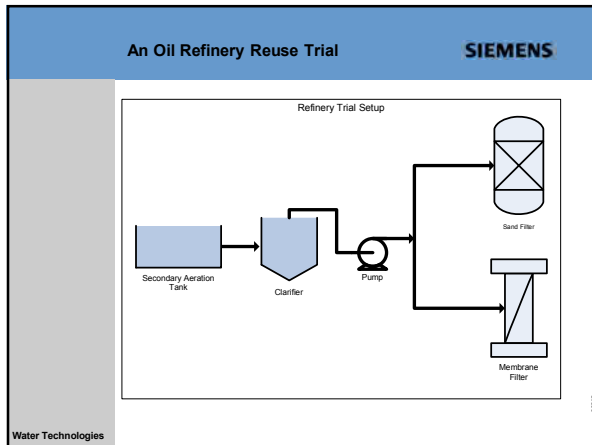
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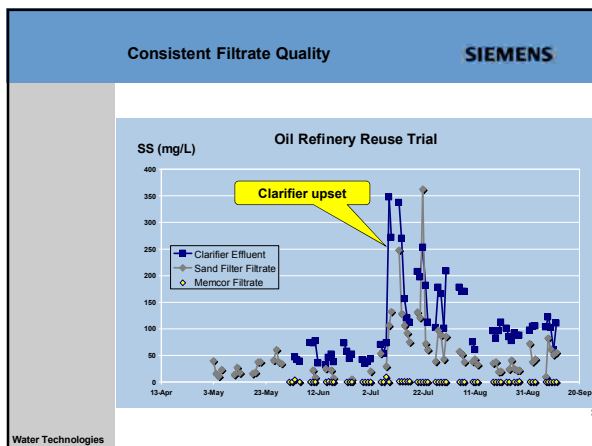
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Memcor® "Sweet Spots"
SIEMENS

**No. 1 - Secondary Effluent Filtration:**

- RO pretreatment
- Reuse

**No. 2 - Potable Water production:**

- Cryptosporidium / Giardia removal
- Small and/or remote communities
- Areas with high projected growth

**No. 3 - Industrial Applications**

- High quality water for production
  - ◆ Turbidity
  - ◆ Biological
- Waste water recycle

Water Technologies
11/08

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**Sweet Spot #1**

**Secondary Effluent Filtration**

Water Technologies
11/08

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Secondary Effluent Filtration
SIEMENS

Typical Secondary Effluent Quality:	
Suspended Solids	< 30 mg/L
BOD	< 30 mg/L
Ammonia	6 - 20 mg/L
pH	> 6.0
Algae	< 104 cells/mL
Total Chlorine	1 - 3 mg/L (total NOT free chlorine)

Water Technologies
11/08

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**Eraring Power Station, NSW** **SIEMENS**

- 7.6 ML/day (2MGD) Pressurised Filtration, 3.75 ML/day (1MGD) RO
- Installed 1995
- Secondary Effluent feed from IDAL
- Product to high pressure boiler feed and generator services



Water Technologies

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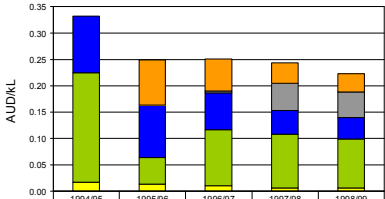
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**Eraring Power Station, NSW** **SIEMENS**

**Production Costs**



	1994/95	1995/96	1996/97	1997/98	1998/99
Analytical	0	0.086	0.061	0.039	0.035
Spares	0	0	0.003	0.052	0.049
Contract	0.107	0.099	0.07	0.045	0.041
Chemicals	0.208	0.05	0.107	0.102	0.093
Fixed Eff.	0.017	0.014	0.01	0.008	0.006

Water Technologies

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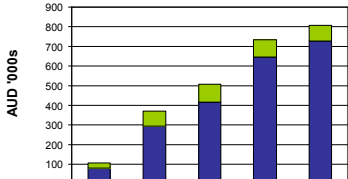
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**Eraring Power Station, NSW** **SIEMENS**

**Cost Savings**



	1994/95	1995/96	1996/97	1997/98	1998/99
Production Saving	26.8	74	90	87	80
Water Saving	78.5	294.5	416.4	647	726.2

Water Technologies

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**West Basin, California** **SIEMENS**

- 4 Plants
- Nett capacity 64 ML/day (17MGD)
- Product to RO for reuse
- Treated Water quality
  - ◆ SDI < 3
  - ◆ Turbidity < 0.1 NTU
  - ◆ > 4 Log Coliform Reduction

Water Technologies

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**Water Factory 21, CA** **SIEMENS**

- 328 ML/day (86.7 MGD)
- Under construction
- Membrane filtration as pretreatment for RO
- Product used for groundwater remediation
- Memcor® membranes selected after 10 years of trials
- Secondary Effluent Feedwater:
  - ◆ Turbidity 2 to 8 NTU
  - ◆ Chloramine Residual 2 to 5 mg/L
  - ◆ Suspended Solids 5 to 10 mg/L
  - ◆ TOC 10 to 12 mg/L

Water Technologies

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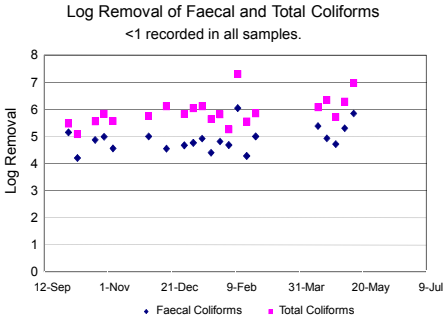
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**Water Factory 21, CA** **SIEMENS**

Log Removal of Faecal and Total Coliforms  
<1 recorded in all samples.



Water Technologies

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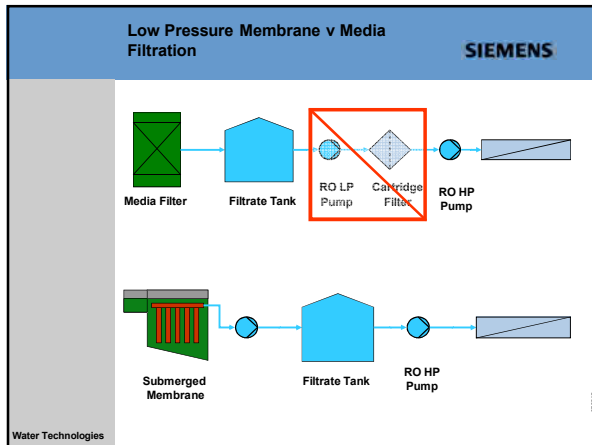
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**Bedok Newater Demo Plant, Singapore** **SIEMENS**

- 13 ML/day (3.4MGD) Pressurised Filtration, 10 ML/day (2.6MGD) RO
- Installed April 2000
- Secondary Effluent feed
- Validated process for reuse
- Treated water now used for bottled drinking water

Water Technologies

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**Kranji HGWRP, Singapore** **SIEMENS**

- 74 ML/d (19.5MGD) Submerged Filtration
- 56 ML/d (14.8MGD) RO
- Installed September 2002
- Dual Membrane Reuse
- Reuse for Microelectronics Fab's



Water Technologies

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**Kranji HGWRP, Singapore** **SIEMENS**



Water Technologies

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**Sydney Olympics - WRAMS** **SIEMENS**

- 7.5ML/day (2MGD) Pressurised Filtration
- 1ML/day (0.26MGD) RO
- Commissioned June, 2000
- Secondary effluent feed
- Treated water for toilet flushing & irrigation



Water Technologies

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**TEDA, Tianjin China** **SIEMENS**

- 30ML/day (7.9MGD) Pressurised System
- Commissioned Sept 2002
- Treats Secondary Effluent for reuse and RO feed



Water Technologies

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**Ji Zhang Zi, Tianjin China** **SIEMENS**

- 20ML/day (5.3MGD) Pressurised System
- Commissioned Dec 2002
- Treats secondary effluent for reuse
- Ozone post treatment



Water Technologies

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**Gerringong, NSW** **SIEMENS**

- 2.4ML/day (0.63MGD)
- Commissioned Aug 2002
- Secondary Effluent feed with Ozone/BAC pretreatment
- Treated water to irrigation or discharge



Water Technologies

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**Mt Barker, SA** **SIEMENS**

- 3ML/day (0.8MGD)
- Installed in 1998 with 50% expansion July 2002
- Algae laden oxidation pond feed
- Alum + DAF pre-treatment
- Treated water to irrigation



Water Technologies

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**Northlakes, NT** **SIEMENS**

- 2ML/day (0.5MGD)
- Commissioned 2002
- DAF pretreatment with up to 300mg/L Alum dosing
- Extremely active algal laden feed
- Treated water for golf course irrigation



Water Technologies

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**SIEMENS**

**Sweet Spot #2**

**Potable Water Production**

Water Technologies

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**Potable Water Production** **SIEMENS**

Typical Potable Water Quality:		
	<i>Clean</i>	<i>Turbid</i>
Turbidity	< 20 NTU	< 100 NTU
Colour	< 10 HCU	< 100 HCU
Algae	< 100 cells/mL	< 10 <sup>4</sup> cells/mL
Hardness	< 200 mg/L	< 200 mg/L
pH	6.0 - 8.5	6.0 - 8.5
Coagulant	Nil	< 20 mg/L

Water Technologies

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**Joyce Rd WPP - Tauranga, NZ** **SIEMENS**

- 36 ML/d (9.5MGD) Pressurised Plant
- Operational Dec '97
- Highly variable feed water
- LRV 5 (> 1 µm) filtrate quality



Water Technologies

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**Oropi Rd - Tauranga, NZ** **SIEMENS**

- Sister plant to Joyce Rd
- 32 ML/day (8.5MGD)
- Expandable to 54ML/day
- Commissioned June, 2002
- Backwash recovery via clarifier





Water Technologies

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**Marulan WTP, NSW** **SIEMENS**

- 1.5 ML/day (0.4MGD) Submerged Membrane Filtration Plant
- Installed 1998
- Feed water Characteristics
  - ◆ Low turbidity (4 NTU)
  - ◆ High Colour (23 HCU)



Water Technologies

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**Duckmaloi, NSW** **SIEMENS**

- 11 ML/d (2.9MGD) Submerged system
- Retrofit to existing clarifier
- Concrete cell
- Commissioned Jan 2003



Water Technologies

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**Argyle Diamond Mine, WA** **SIEMENS**

- 3 ML/d (0.8MGD)
- Installed in 1991
- Drinking water from highly variable feed (Lake Argyle)



Water Technologies

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**Aqua 2000 - Bendigo, Vic** **SIEMENS**

- Capacity 126 ML/d (33 MGD)
- Surface water (Colour 5 - 20 HCU)
- Tight water quality targets:
  - ◆ Turbidity at each filter < 0.1 NTU
  - ◆ Particles at each filter < 10 particle/mL
  - ◆ Protozoa > Log 4 removal
  - ◆ THMFP < 80 µg/L
  - ◆ Algae Toxins
  - ◆ Colour, Taste & Odour



Water Technologies

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**Mt Pleasant WTP, SA** **SIEMENS**

- 2 ML/d (0.53MGD)
- Installed 2000
- Tight footprint requirement



Water Technologies

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**SIEMENS**

**Sweet Spot #3**

**Industrial Applications**

Water Technologies

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**McKinley Paper, New Mexico**
**SIEMENS**

- 1.9ML/day (0.5MGD) Membrane Filtration
- 1ML/day (0.26MGD) RO
- Commissioned May, 1994
- Feed from IDAL on paper mill waste
- Integral part of Zero discharge paper mill



Water Technologies

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**Other Industrial Applications**
**SIEMENS**

Project Name	Country	Application	Capacity (ML/D)	Memcor Model	Operational Date
Apex Chemicals, Queensland	Australia	Industrial Process Water High Purity Water	300	1 X 20M3	Oct05
Buckman	Australia	Industrial Process Water High Purity Water	300	1 X 20M3	Jan07
Wool	Australia	Industrial Process Water High Purity Water	300	1 X 20M3	Jan07
Boonville Naval Shipyard	USA	Industrial Process Water RO Pre-treatment	11.00	4 X 20M3	Nov08
Carlisle Technologies, Brisbane	Australia	Industrial Process Water	300	1 X 20M3	Mar06
Carlisle Technologies, Liverpool	Australia	Industrial Process Water	300	1 X 20M3	Mar06
Carlisle Technologies, Perth	Australia	Industrial Process Water	300	1 X 20M3	Apr06
Cardinal - West Memphis	USA	Industrial Process Water RO Pre-treatment	2.50	1 X 20M3	Jul02
Chloro-Ferrocene	UK	Industrial Process Water RO Pre-treatment	40.0	2 X 20M3	Nov05
Chloro-Ferrocene	Denmark	Industrial Process Water	6.00	3 X 20M3	Apr02
Chloro-Ferrocene	France	Industrial Process Water RO Pre-treatment	15.00	1 X 20M3	Jul07
Chloro-Ferrocene	Japan	Industrial Process Water RO Pre-treatment	3.00	1 X 20M3	Jul00
Chloro-Ferrocene	Japan	Industrial Process Water RO Pre-treatment	3.00	1 X 20M3	Dec07
Chloro-Ferrocene	France	Industrial Process Water RO Pre-treatment	3.00	1 X 20M3	Apr05
Chloro-Ferrocene	Brazil	Industrial Process Water	15.14	7 X 20M3	Apr02

Water Technologies

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Monday, 14 August 2006

## “Sweet Spots” and Key Applications

Water Technologies

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